CITY OF LODI

COUNCIL COMMUNICATION

AGENDA TITLE: Cherokee Lane, from Kettleman Lane to Lodi Avenue - Optimum Signal Location

MEETING DATE: December 4, 1991

PREPARED BY: Public Works Director

RECOMMENDED ACTION: That the City Council place two intersections, Cherokee and Tokay and Cherokee and Hale, on the Capital Improvement Project (CIP) list for traffic signal installations.

BACKGROUND INFORMATION: As part of the recent City Council discussions about Cherokee Lane, Public Works staff indicated a study was underway which would determine the appropriate location(s) for a traffic signal(s) between Kettleman Lane and Lodi Avenue. Much of the Cherokee Lane discussion involved the intersection of Cherokee/Hale. The concerns were for the safety of school-age children and other pedestrians crossing Cherokee Lane.

The Electric Utility Department and Public Works Department have recently installed a flashing beacon, larger pedestrian signs and a modified crosswalk to provide improved notification of pedestrians crossing Cherokee Lane at Hale Road. The next step to improving pedestrian safety on Cherokee Lane would be to install a traffic signal between Lodi Avenue and Kettleman Lane. This step raised the question of which location or locations would be best for a traffic signal. The study considered Tokay Street, Hale Road, Vine Street, Poplar Street, Eden Street, Delores Street and the K-Mart driveway.

Staff conducted a traffic signal progression analysis for that portion of Cherokee Lane. The analysis was conducted using a computer software application called PASSER.

PASSER Analysis

PASSER is the acronym for the Progression Analysis and Signal System Evaluation Routine. The software has many uses, one of which is to determine the optimum locations and timing for signals which will allow vehicles to travel along a roadway segment at a constant speed without being stopped by a red light. By entering data such as the intersection peak hour turning movements, distance between intersections, and desired speed range, the computer software will provide various factors to determine the best locations and timing of signals. These factors include optimum cycle length, recommended speed, bandwidth, efficiency, attainability and intersection delay. The efficiency level directly relates to a range of progression from "poor" to "great". Appendix A provides a definition of efficiency as well as an explanation of the other factors. By reviewing the

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APPROVED: _____

THOMAS A. PETERSON

factors, staff determined the best combination of signalized intersections on Cherokee Lane, from a progression standpoint, would be as follows:

Hale Road and Poplar Street
Hale Road and Delores Street
Tokay Street, Hale Road and Poplar Street
Tokay Street and Hale Road
Tokay Street, Hale Road and Vine Street
Tokay Street and Vine Street

All of the above combinations will provide "great" progression (i.e. "efficiency of 0.37 or higher) and minimum delay at the intersections. Table 1 of Appendix A presents the actual values.

fraffic Signal Guidelines/Priority List

The intersections studied and the volumes are shown in Exhibit A. The progression analysis assumed all the signals satisfied the Caltrans traffic signal guidelines. However, two intersections, Cherokee Lane/Poplar Street and Cherokee Lane/Delores Street, do not presently meet the signal warrant guidelioes. Therefore, three of the signal combinations listed above would not be appropriate until volumes increase on the side streets or other factors change.

The Cherokee Lane and Tokay Street, and Cherokee Lane and Hale Road 'intersections satisfy the Caltrans traffic signal guidelines and, therefore, they are included on the updated 1990 Signal Priority Study list (Exhibit B). Currently, there are twenty additional intersections that satisfy the Caltrans traffic signal guidelines. Two of the twenty intersections are under construction, Hutchins Street and Vine Street and Kettleman Lane and Mills Avenue and have been removed from the signal priority list. The Cherokee Lane and Tokay Street, and Cherokee Lane and Hale Road intersections are #5 and #16, respectively, on the updated signal priority list. The Cherokee Lane and Vine Street intersection is already on the signal priority list as #18. All these locations will be shown in the Street Capital Improvement Program list of projects. Funding and timing of installations would best be discussed along with the entire program.

A traffic signal located at Cherokee Lane and Tokay Street could include signalizing the Tokay Bowl southern driveway. This driveway is directly across from Tokay Street. If the southern driveway is signalized, staff will recommend closing the northern driveway. A signal at Cherokee Lane and Tokay Street will provide a protected pedestrian crossing for students walking to and from the Heritage Elementary School and patrons walking to and from K-Mart.

A traffic signal located at Cherokee Lane and Hale Road will provide a protected pedestrian crossing for patrons using the Star Market as well as students attending Heritage Elementary School.

General

In reviewing citywide pedestrian accidents from 1987 to 1990, there are five intersections that have had three or more pedestrian accidents. Four of the intersections are on Cherokee Lane--Locust Street (three accidents), Elm Street (three accidents), Eden Street (five accidents) and Hale Road (three accidents). The other intersection that has had three accidents is at a signalized intersection, Church Street and Lodi Avenue.

A traffic signal located at Cherokee/Hale and/or Cherokee/Tokay will provide a higher degree of safety for pedestrians but accidents may still occur at these intersections. It should also be noted that once a signal is installed at Hale and Cherokee this intersection will be far from meeting the criteria for an adult crossing guard. For young children, crossing at this intersection will still be intimidating. Busing may still be the best solution to the school crossing problem.

FUNDING: To be determined in CIP.

Jack L. Ronsko
Public Works Director

Prepared by Paula 3. Fernandez, Assistant Civil Engineer - Traffic

JLR/PJF/lm

Attachment

cc: City Attorney
Concerned citizens (including attendees of Shirtsleeve "Cherokee Lane Tour")
Chamber of Commerce

Exhibit A

CITY OF LODI

PUBLIC WORKS DEPARTMENT

CHEROKEE LANE
LODI AVE - KETTLEMAN LN
DAILY TRAFFIC VOLUMES

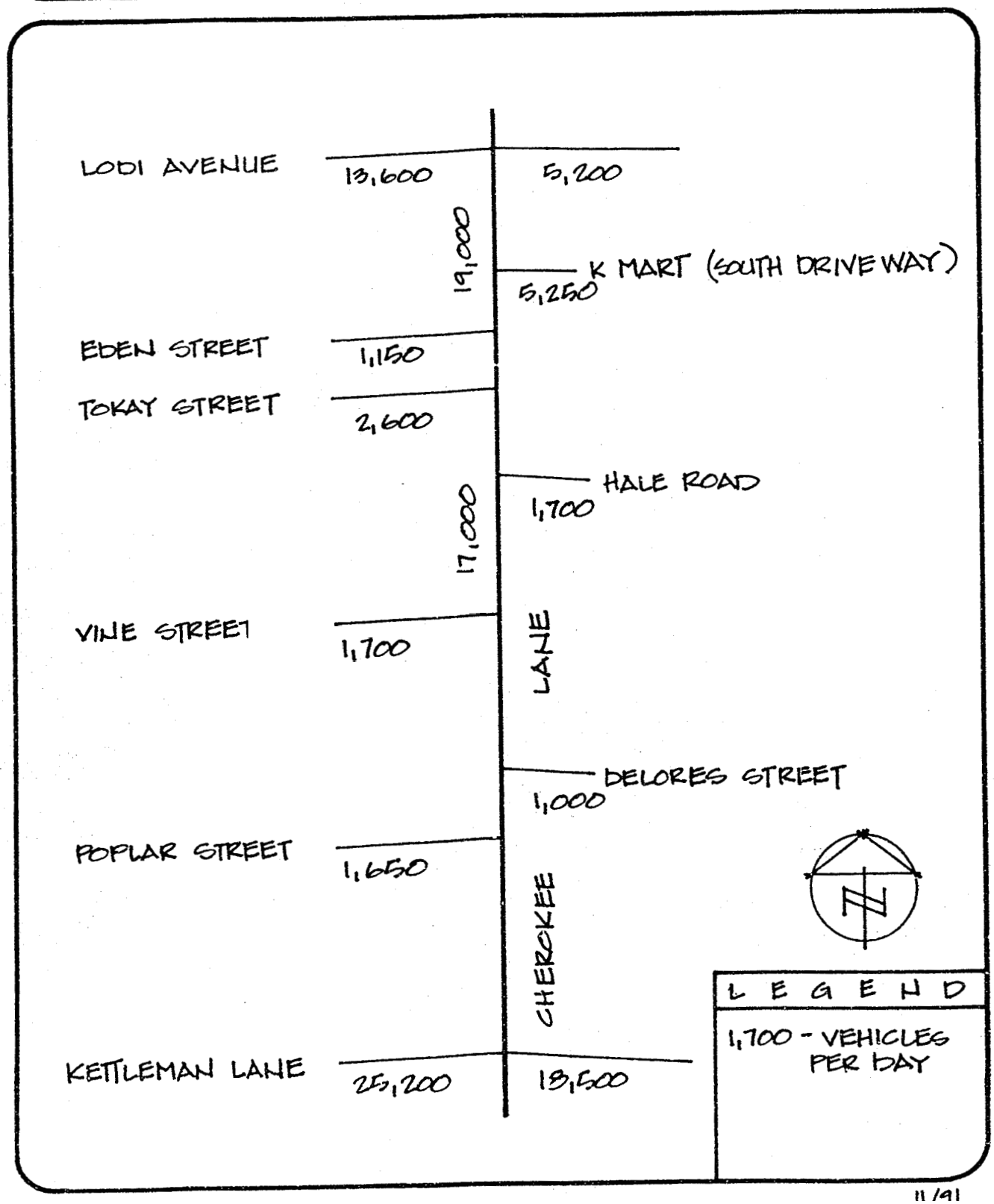

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Exhibit B

1990 Signal Priority List
(Updated 1991)

1.	Lockeford Street/Stockton Street	485
2.	Lockeford Street/Sacramento Street	460
3.	Turner Road/Stockton Street	338
4.	Lower Sacramento Road/Vine Street	314
5.	Cherokee Lane/Tokay Street	273
6.	Harney Lane/Stockton Street	270
7.	Lodi Avenue/Mills Avenue	242
8.	Lower Sacramento Road-Woodhaven Lane/Turner Road	239
9.	Kettleman Lane/Central Avenue	239
10.	Kettleman Lane/Crescent Avenue	234
11.	Turner Road/Mills Avenue	233
12.	Pine Street/Stockton Street	218
13.	Harney Lane/Ham Lane	195
14.	Mills Avenue/Elm Street	190
15.	Turner Road/Edgewood Drive	186
16.	Cherokee Lane/Hale Road	182
17.	Ham Lane/Century Boulevard	172
18.	Cherokee Lane/Vine Street	148
19.	Hutchins Street/Pine Street	141
20.	Cherokee Lane/Elm Street	89

Appendix A

Explanation of Progression Terms

The basic definition of two common terms used to describe signal timing parameters are as follows:

Cycle length - The time period in seconds required for one complete sequence of signal indications (green, amber, red for both streets). The cycle length usually ranges between 60-120 seconds. The more cptions an intersection has, such as separate left-turn phases (arrows), the longer the cycle length will be. Longer cycle lengths increase the average delay for stopped vehicles.

Optimum cycle length - **PASSER** determines the best cycle length to provide the best progression.

Recommended speed - PASSER provides a recommended speed for the major street which is within 2 mph± of the desired speed entered. The recommended speed takes into account the maximum bandwidth required to obtain the best progression plan. Several trials were made, and depending on the progression plan, the recommended speeds ranged from 33 to 37 mph.

PASSER uses three measures to estimate the quality of progression: bandwidth, efficiency and attainability.

Bandwidth - The number of seconds during each signal cycle length that is devoted to progressive traffic flow in a given direction along the major street. Larqer bandwidths mean more vehicles can be accommodated in a single green wave. -However, creating larger bands by simply increasing the cycle-length increases the average delay for stopped vehicles. Therefore, "efficiency", which relates bandwidth to cycle length, is considered a better measure of signal progression quality than bandwidth alone.

Efficiency - The average fraction of the cycle used for progression. It is a ratio of seconds of bandwidth to cycle length. **PASSER** provides a value that relates to the following levels:

0.00–0.12	Poor progression
0.13-0.24	Fair progression
0.25–0.36	Good progression
0.37+	Great progression

Attainability - The ratio of seconds of smallest arterial green to the bandwidth. The values can range from 0.00 to 1.00. The higher values provide more desirable solutions.

Another term commonly used to evaluate the performance of intersections is the fol1owing:

Intersection delay - The total delay of vehicles divided by the total number of vehicles which is expressed in seconds per vehicle. The intersection delay relates to level of' service which is a qualitative measure of traffic operating conditions at an intersection whereby a letter grade, "A" through "F", is

assigned. LOS "A" indicates free-flowing conditions with minimal delay, while "F" indicates highly congested conditions with lengthy delays. The following delay values relate to the level of service:

Average Intersection Delay (sec/veh)	Level of Service
0.0 - 5.0	A
5.1 - 15.0	B
15.1 - 25.0	C
25.1 - 40.0	D
40.1 - 60.0	E
60.0+	F

Table 1 presents the results of the PASSER analysis. Another PASSER output that provides a visual aid of the progression plan is the time-space diagram. Figure 1 shows PASSER's recommended speed for the Tokay Street, Hale Road and Vine Street progression plan, as well as hand-drawn speeds of **30** mph and 40 mph.

General

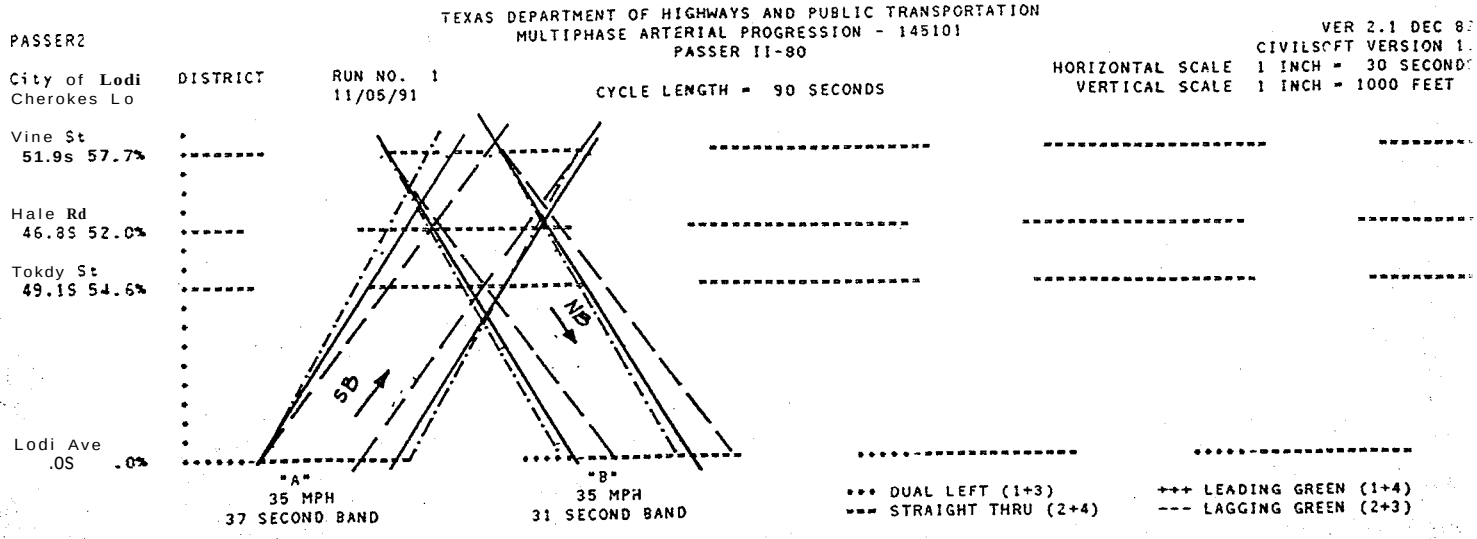
Initially, the Cherokee bane and Kettleman Lane intersection was included in the progression analysis. However, a cycle length of 105 seconds is required to accommodate all of the phases of this intersection. With a higher cycle length, the intersection delay **for** all the intersection was also high. Without including Cherokee bane and Kettleman Lane intersection, the minimum cycle length is 71 seconds.

The analysis also assumed separate left-turn phases on Cherokee Lane at Lodi Avenue. In the near future, these separate phases will need to be implemented.

Table 1

Condition	Cycle Length	Effi-ciency	Attain-ability	Band A width (sec)	Band A speed (mph)	Band B width (sec)	Band B speed (mph)	Overall Delay (sec/veh)	Level of Service
Lodi, Hale, Poplar	90	0.48	1.00	41	34	44	34	14.15	B
Lodi, Hale, Delores	84	0.45	1.00	37	33	38	33	13.89	B
Lodi, Tokay, Hale, Poplar-90	90	0.41	0.85	40	33	33	33	12.76	B
Lodi, Tokay, Hale-90	90	0.41	0.85	40	33	33	33	13.76	B
Lodi, Tokay, Hale, Poplar	84	0.40	0.89	36	33	31	33	12.5	B
Lodi, Tokay, Hale	84	0.40	0.89	37	33	30	33	13.24	B
Lodi, Tokay, Hale, Vine	90	0.39	0.80	37	35	31	35	12.75	B
Lodi, Tokay, Vine	90	0.39	0.80	37	35	31	35	16.75	C
Lodi, Eden, Vine	90	0.35	0.72	33	37	28	37	14.59	B
Lodi, Eden, Vine, Poplar	90	0.33	0.68	31	34	27	3	13.61	B
Lodi, K-mart, Tokay	84	0.30	0.67	28	33	22	33	16.29	C
ALL INT	87	0.30	0.64	27	33	24	35	12.42	B
Lodi, Eden, Vine, Kettleman	105	0.35	1.00	37	33	37	33	26.11	D
Lodi, Hale, Delores, Kettleman	105	0.35	1.00	37	33	37	33	27.97	D
Lodi, Vine, Kettleman	105	0.35	1.00	37	35	37	35	30.78	D
Lodi, Tokay, Hale, Vine, Kettleman	110	0.34	1.00	37	37	37	37	22.96	C
Lodi, Tokay, Vine, Kettleman	110	0.34	1.00	37	37	37	37	26.49	D
Lodi, Eden, Vine, Poplar, Kettleman	110	0.32	0.94	37	37	32	37	24.66	C
Lodi, Hale, Poplar, Kettleman	110	0.32	0.94	37	37	32	37	25.33	D
ALL INT	120	0.31	0.99	37	34	36	35	20.33	C
Lodi, Hale, Kettleman	120	0.30	0.97	37	35	34	35	32.63	D
Lodi, Kmart, Tokay, Kettleman	105	0.30	0.86	34	33	29	33	26.29	D
Lodi, Tokay, Hale, Vine, Kettleman-31 mph	120	0.31	1.00	37	33	37	33	24.06	C
Lodi, Tokay, Vine, Kettleman-31 mph	120	0.31	1.00	37	33	37	33	28.17	D
Lodi, Tokay, Hale, Vine, Kettleman-39mph	110	0.34	1.00	37	37	37	37	22.96	C
Lodi, Tokay, Vine, Kettleman-39 mph	110	0.34	1.00	37	37	37	37	26.49	D

FIGURE 1



Legend

——— 35 mph (Passer recommended speed)

— — 30 mph

—·—·— 40 mph

CITY OF LODI

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December 2, 1991

SUBJECT: Cherokee Lane, from Kettleman Lane to Lodi Avenue - Optimum Signal Location

Dear Concerned Citizen:

Enclosed is a copy of background information on an item that will be discussed at the City Council meeting on Wednesday, December 4, 1991, at 7:30 p.m. The meeting will be held in the City Council Chamber, Carnegie Forum, 305 West Pine Street. You are welcome to attend.

If you wish to communicate with the City Council, please contact Alice Reimche, City Clerk, at (209) 333-6702.

If you have any questions about the item, please call Paula Fernandez or me at (209) 333-6706.

Jack L. Ronsko
Public Works Director

JLR/lm

Enclosure

cc: City Clerk
Chamber of Commerce

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